

APPROVED BY
BUREAU OF EXPLOSIVES

D n / Jeff

DATE *11/23/95*

LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF MAU-157/B, MAU-157A/B, AND/OR MAU-169/B COMPUTER CONTROL GROUPS PACKED IN CNU-152/E CONTAINERS

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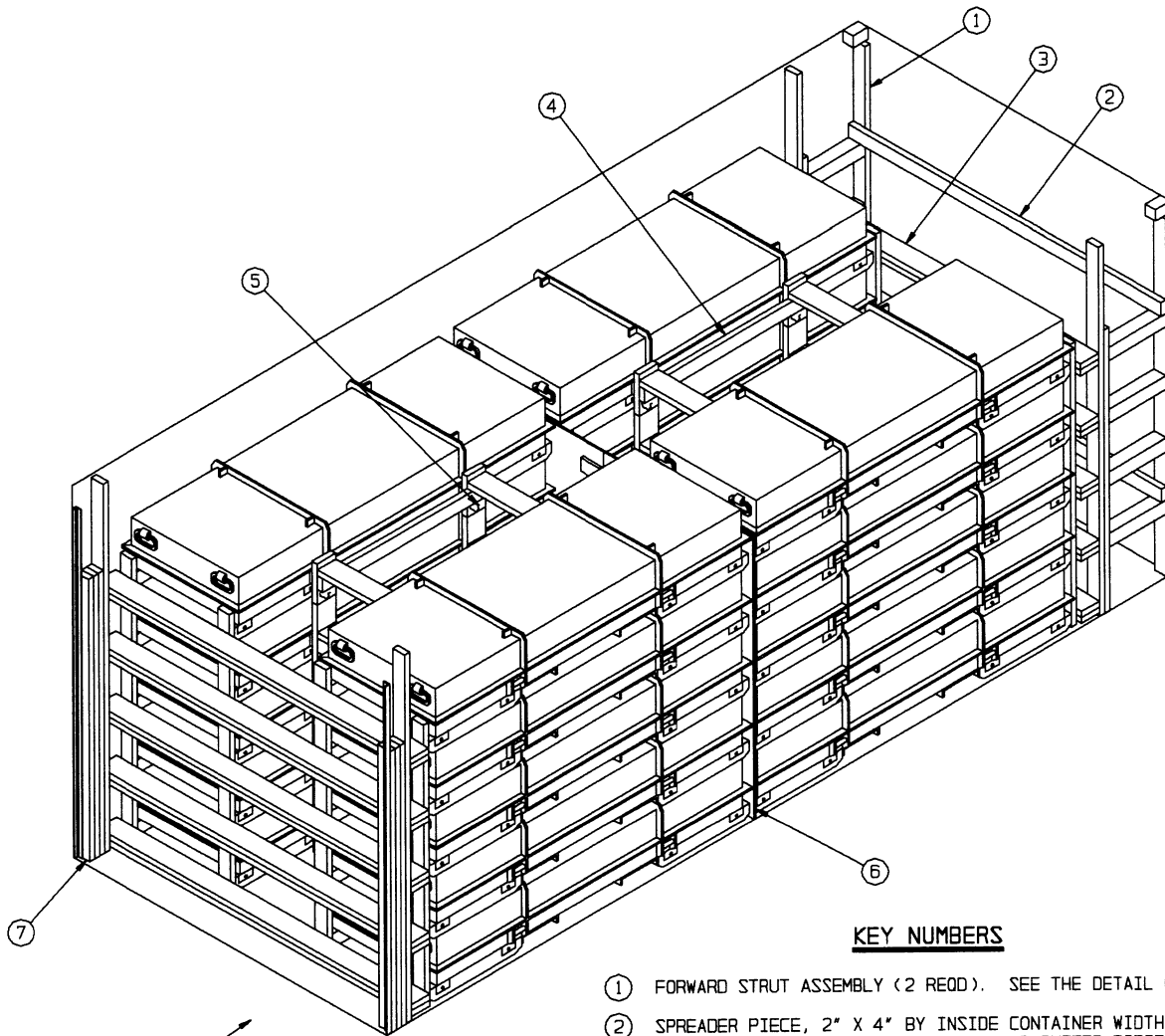
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● LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS.

| U.S. ARMY MATERIEL COMMAND DRAWING | | | |
|---|---------------------------------|--|--|
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| | CLASS | DIVISION | DRAWING |
| | 19 | 48 | 8578 |
| | | | FILE |
| | | | SP15J62 |

DO NOT SCALE

PROJECT SP 280-93



REAR OF CONTAINER. →

ISOMETRIC VIEW

KEY NUMBERS

- ① FORWARD STRUT ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 6.
- ② SPREADER PIECE, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (2 REQD). NAIL TO THE BUFFER PIECES OF PIECE MARKED ① W/2-10d NAILS AT EACH END.
- ③ FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 6. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECES OF PIECE MARKED ① W/6-10d NAILS.
- ④ CENTER FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ⑤ TIE WIRE, NO. 14 GAGE WIRE 18" LONG (8 REQD, 1 PER EACH VERTICAL PIECE OF PIECE MARKED ④). INSTALL TO FORM A COMPLETE LOOP AROUND A CENTER FILL ASSEMBLY VERTICAL PIECE AND THE LIFTING BAR ON THE CONTAINER. BRING ENDS TOGETHER AND TWIST TAUT. NOTE: IF THE REAR VERTICAL PIECES OF PIECE MARKED ④ CANNOT BE EASILY REACHED, WIRES MAY BE APPLIED AT AN UPPER AND LOWER LOCATION ON EACH OF THE TWO FRONT VERTICAL PIECES OF PIECE MARKED ④.
- ⑥ SEPARATOR GATE (1 REQD). SEE THE DETAIL ON PAGE 5.
- ⑦ FILL MATERIAL, 4" WIDE BY 72" LONG MATERIAL (AS REQD). NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/S NAILS OF A SUITABLE SIZE (10d FOR 2" THICK MATERIAL). NAIL EACH ADDITIONAL PIECE TO THE PREVIOUS PIECE IN A SIMILAR MANNER. NOTE: MULTIPLE PIECES MAY BE LAMINATED TOGETHER FIRST AND THEN TOENAILOED TO THE REAR BLOCKING ASSEMBLY. SEE THE "DETAIL A" AND "DETAIL B" ON PAGE 7.

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|-----------|----------|-----------------|
| CNU-152/E | 20 | 13,860 LBS |
| DUNNAGE | | 893 LBS |
| CONTAINER | | 4,700 LBS |

TOTAL WEIGHT ----- 19,453 LBS (APPROX)

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|-------------------|------------------|------------|
| 1" X 4" | 3 | 1 |
| 2" X 4" | 241 | 161 |
| 2" X 6" | 233 | 233 |
| 4" X 4" | 12 | 16 |
| NAILS | NO. REQD | POUNDS |
| 6d (2") | 18 | 1/4 |
| 10d (3") | 480 | 7-1/2 |
| 12d (3-1/4") | 32 | 3/4 |
| PLYWOOD, 1/2" - | 45.00 SQ FT REQD | 61.88 LBS |
| WIRE, NO. 14 GAGE | 12' REQD | 1/4 LBS |

- H. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- J. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- K. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- L. MAXIMUM LOAD WEIGHT CRITERIA:

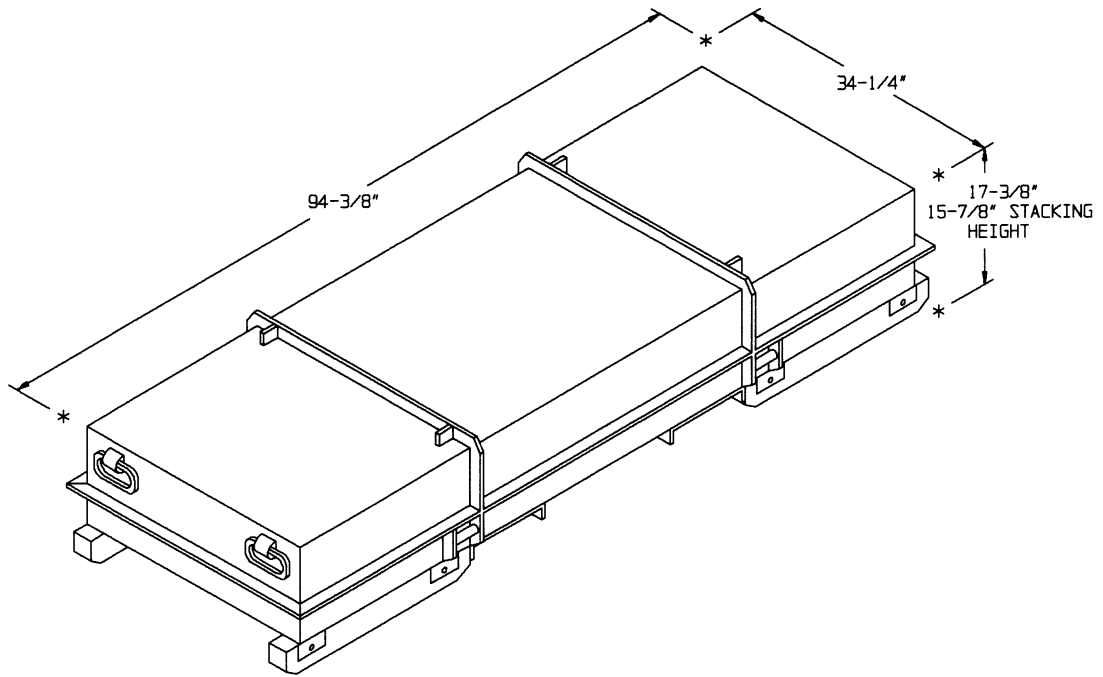
THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM.
- M. REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW:
 - 1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
 - 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.
- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4 MM AND ONE POUND EQUALS 0.454 KG.
- P. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL-LOAD" DETAIL ON PAGE 9.
- Q. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS AND THE END OPENING ISO CONTAINER, AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- R. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
 - 1. PREFABRICATE TWO FORWARD STRUT ASSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES, TWO CENTER FILL ASSEMBLIES, AND ONE SEPARATOR GATE.
 - 2. INSTALL THE TWO FORWARD STRUT ASSEMBLIES AND THE TWO SPREADER PIECES.
 - 3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
 - 4. LOAD 10 CONTAINERS.
 - 5. INSTALL ONE CENTER FILL ASSEMBLY AND WIRE TIE IT TO THE CONTAINERS.
 - 6. INSTALL THE SEPARATOR GATE.
 - 7. REPEAT STEPS 4 AND 5.
 - 8. INSTALL THE REAR BLOCKING ASSEMBLY.
 - 9. INSTALL THE SOLID FILL MATERIAL.

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE UNLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO LOADS OF MAU ITEMS INCLUDING MAU-157/B, MAU-157A/B, AND MAU-169/B PACKED IN CNU-152/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH MAU ITEMS. SEE PAGE 4 FOR DETAIL OF THE CONTAINER. CAUTION: REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 4,700 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH END OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 95" HIGH (93" CLEAR HEIGHT) AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE VERTICAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE STRUTS IN THE CENTER FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER.
- E. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- F. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER FORWARD WALL, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL BLOCKING.

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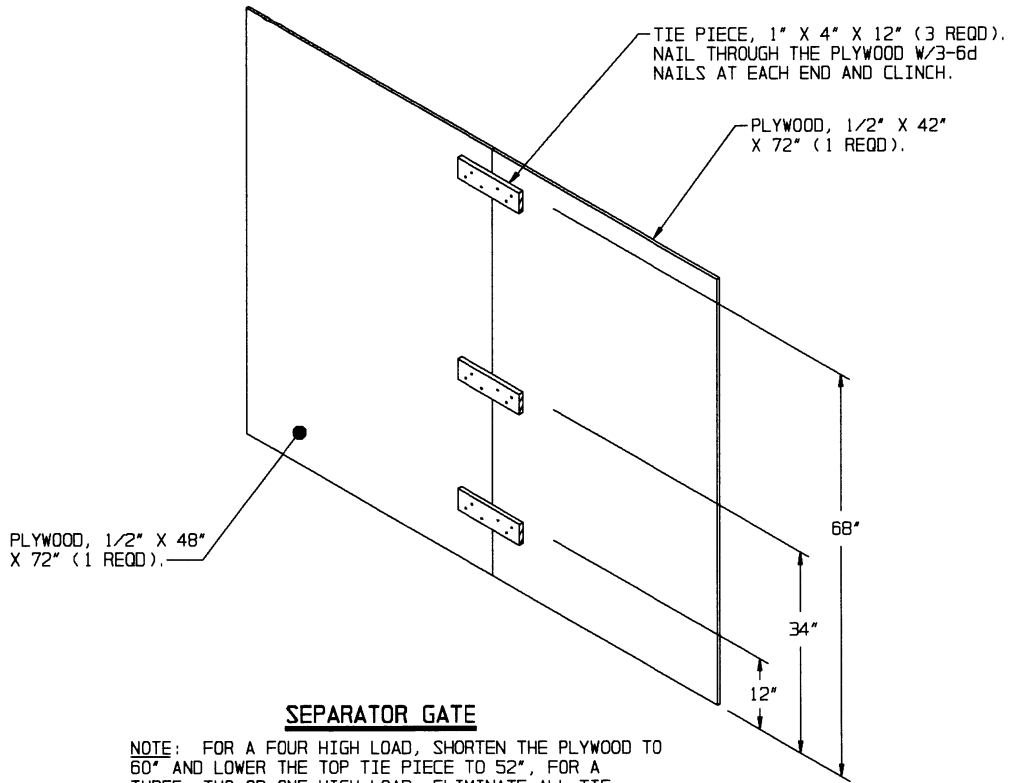
MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, TYPE A, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- WIRE, CARBON STEEL - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, .0800" DIA, GRADE 1006 OR BETTER.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- ANTI-CHAFING MATERIAL - - - - - : MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.



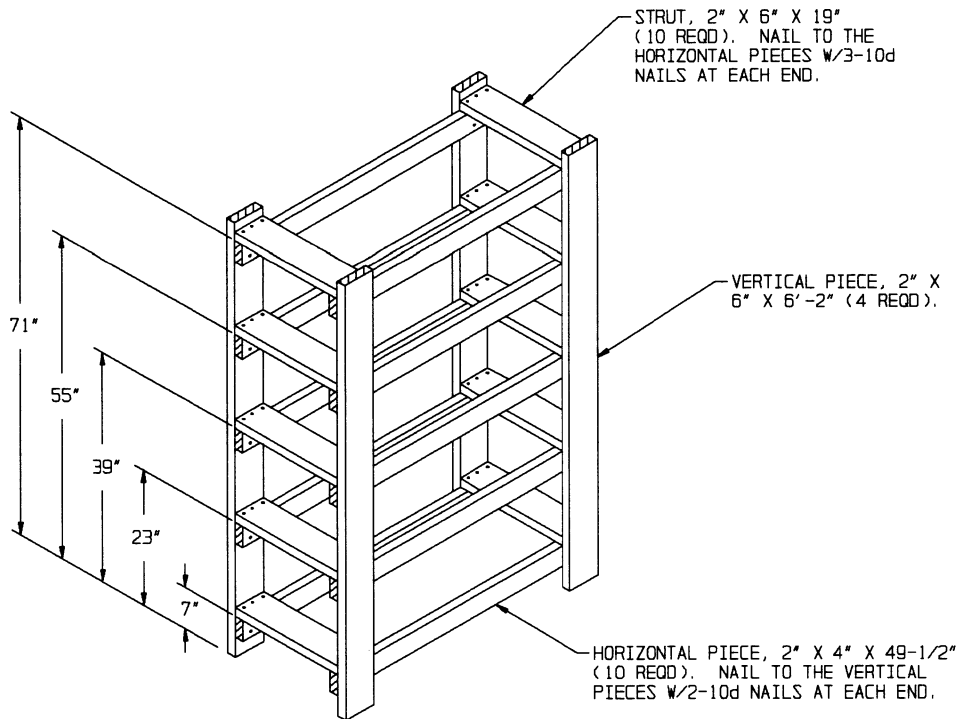
CNU-152/E CONTAINER

CONTAINER WEIGHT ----- 693 LBS (APPROX)
CUBE ----- 32.5 CUBIC FEET (APPROX)



SEPARATOR GATE

NOTE: FOR A FOUR HIGH LOAD, SHORTEN THE PLYWOOD TO 60" AND LOWER THE TOP TIE PIECE TO 52", FOR A THREE, TWO OR ONE HIGH LOAD, ELIMINATE ALL TIE PIECES AND USE ONE PIECE OF PLYWOOD, 48" HIGH (MAY BE SHORTER FOR THE TWO AND ONE HIGH LOADS IF DESIRED), BY INSIDE CONTAINER WIDTH MINUS 1" LONG.



CENTER FILL ASSEMBLY

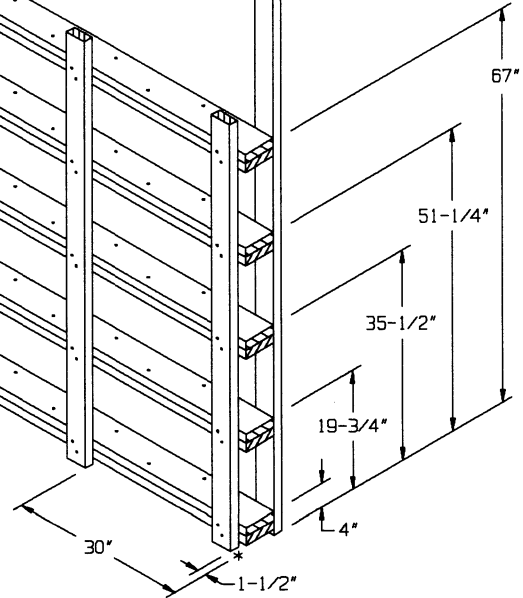
NOTE: FOR A FOUR HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES AND THE TOP TWO STRUTS, FOR A THREE HIGH LOAD, ELIMINATE THE TOP FOUR HORIZONTAL PIECES AND THE TOP FOUR STRUTS, FOR A TWO HIGH LOAD, ELIMINATE THE TOP SIX HORIZONTAL PIECES AND THE TOP SIX STRUTS, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP EIGHT HORIZONTAL PIECES AND THE TOP EIGHT STRUTS. SHORTEN THE VERTICAL PIECES APPROPRIATELY.

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-10") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH JOINT.

BEAM ASSEMBLY, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (DOUBLED) (5 REQD). LAMINATE THE FIRST PIECE TO THE SECOND W/11-10d NAILS.

VERTICAL PIECE, 2" X 4" X 72" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH JOINT.

1-1/2"
30"



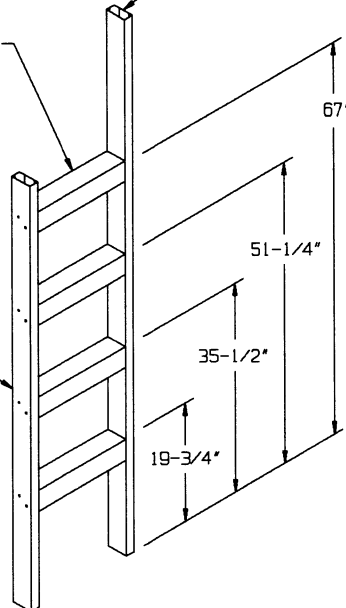
FORWARD/REAR BLOCKING ASSEMBLY

NOTE: FOR A FOUR HIGH LOAD, ELIMINATE THE TOP BEAM ASSEMBLY, FOR A THREE HIGH LOAD, ELIMINATE THE TOP TWO BEAM ASSEMBLIES, FOR A TWO HIGH LOAD, ELIMINATE THE TOP THREE BEAM ASSEMBLIES, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP FOUR BEAM ASSEMBLIES. SHORTEN THE VERTICAL PIECES APPROPRIATELY.

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-7") (1 REQD). NAIL TO THE STRUTS W/2-12d NAILS AT EACH JOINT.

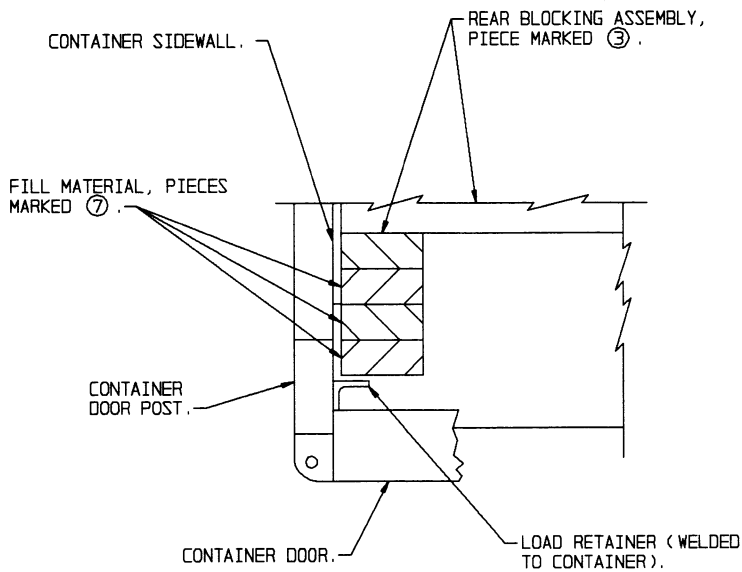
STRUT, 4" X 4" X 17" (4 REQD). SEE THE "SPECIAL NOTE" ON PAGE 7.

VERTICAL PIECE, 2" X 4" X 72" (1 REQD). NAIL TO THE STRUTS W/2-12d NAILS AT EACH JOINT.



FORWARD STRUT ASSEMBLY

NOTE: FOR A FOUR HIGH LOAD, ELIMINATE THE TOP STRUT, FOR A THREE HIGH LOAD, ELIMINATE THE TOP TWO STRUTS, FOR A TWO HIGH LOAD, ELIMINATE THE TOP THREE STRUTS, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP THREE STRUTS AND LOCATE THE BOTTOM STRUT AT 4". SHORTEN THE VERTICAL PIECE APPROPRIATELY.

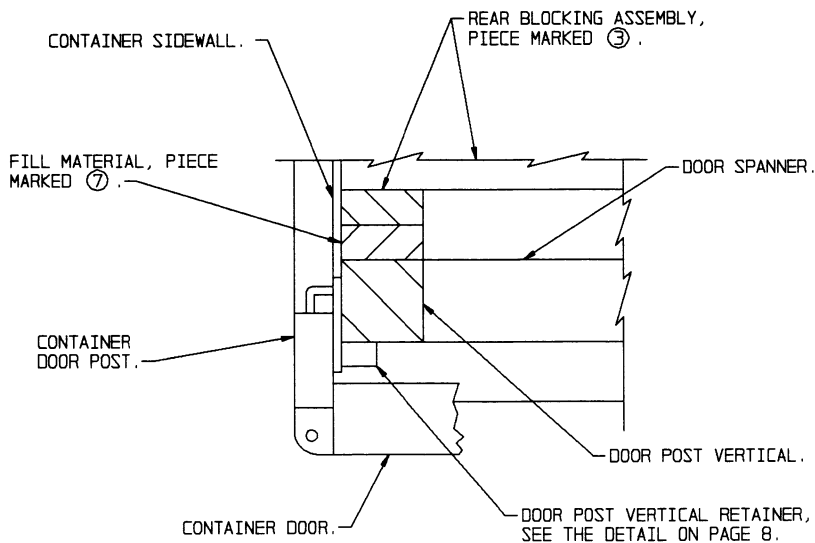


DETAIL A

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE FILL MATERIAL AND ADJACENT DUNNAGE PIECES.

SPECIAL NOTE:

WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICALS, DOOR POST VERTICAL RETAINERS AND DOOR SPANNERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. THE STRUTS IN THE FORWARD STRUT ASSEMBLY DEPICTED ON PAGE 6 MAY BE SHORTENED TO ALLOW ADDITIONAL SPACE AT THE REAR OF THE LOAD WHEN USING DOOR POST VERTICALS, ETC., AS DESCRIBED ABOVE, AS LONG AS GENERAL NOTE "H" ON PAGE 3 IS ADHERED TO. SEE PAGE 8 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.

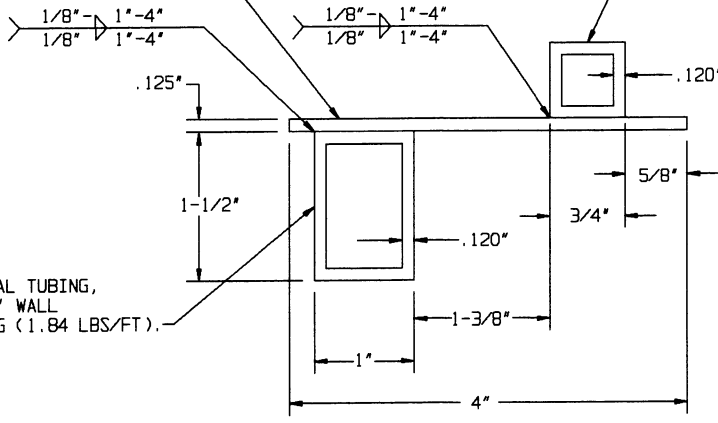


DETAIL B

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE DOOR POST VERTICAL RETAINER AND ADJACENT DUNNAGE PIECES.

STEEL STRIP, 1/8" THICK BY 4" WIDE
BY 83" LONG (1.70 LBS/FT).

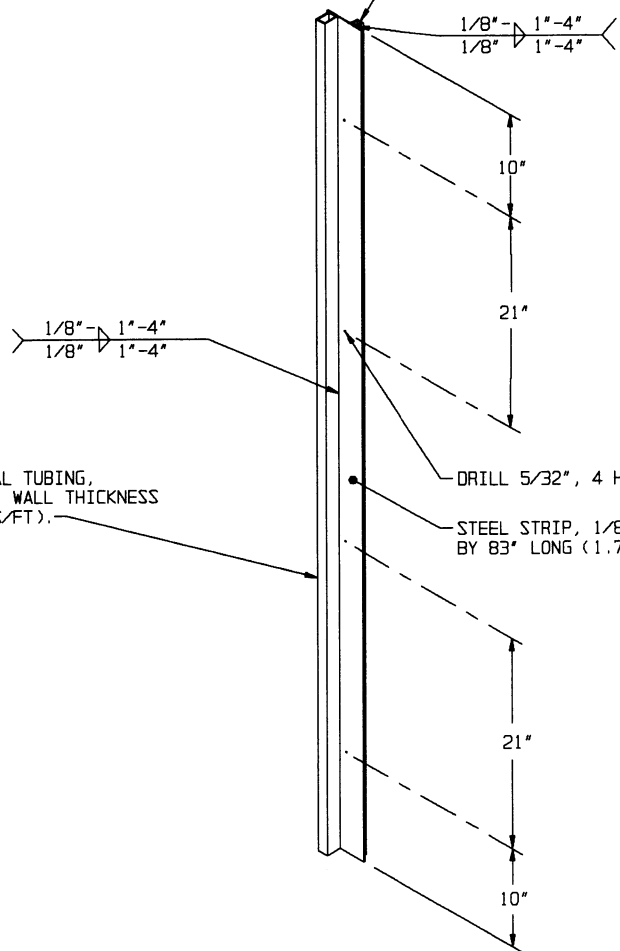
SQUARE STRUCTURAL TUBING, 3/4" SQUARE
BY .120" WALL THICKNESS BY 83" LONG
(1.03 LBS/FT).



RECTANGULAR STRUCTURAL TUBING,
1-1/2" BY 1" BY .120" WALL
THICKNESS BY 83" LONG (1.84 LBS/FT).

VIEW A

VIEW A
SQUARE STRUCTURAL TUBING,
3/4" SQUARE BY .120" WALL
THICKNESS BY 83" LONG
(1.03 LBS/FT).

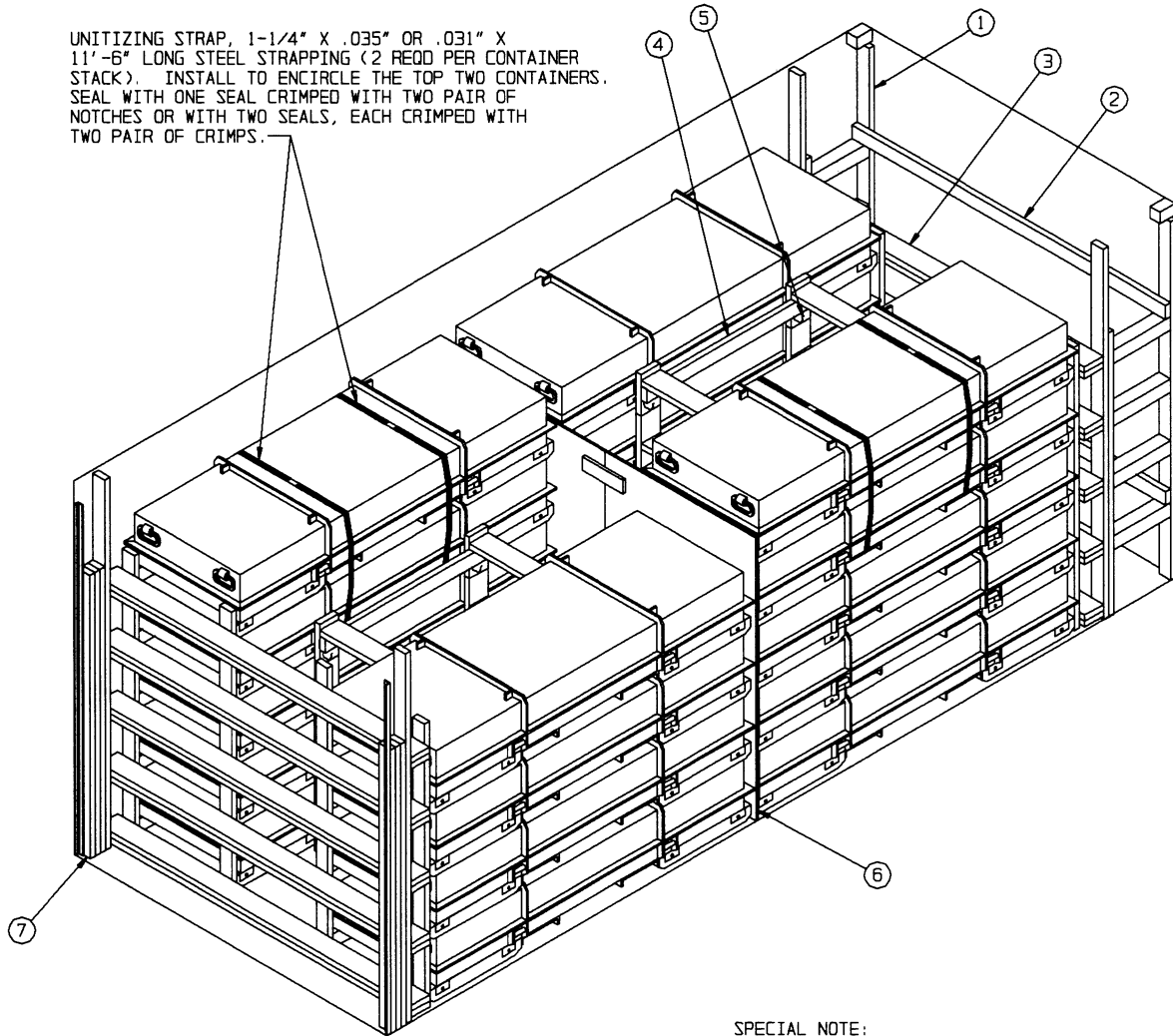


RECTANGULAR STRUCTURAL TUBING,
1-1/2" BY 1" BY .120" WALL
THICKNESS
BY 83" LONG (1.84 LBS/FT).

DRILL 5/32", 4 HOLES.
STEEL STRIP, 1/8" THICK BY 4" WIDE
BY 83" LONG (1.70 LBS/FT).

DOOR POST VERTICAL RETAINER

UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-6" LONG STEEL STRAPPING (2 REED PER CONTAINER STACK). INSTALL TO ENCIRCLE THE TOP TWO CONTAINERS. SEAL WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES OR WITH TWO SEALS, EACH CRIMPED WITH TWO PAIR OF CRIMPS.



ISOMETRIC VIEW

SPECIAL NOTE:

WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS, IT WILL BE NECESSARY TO UNITIZE THE CONTAINER STACKS WHICH ARE Laterally and Longitudinally Adjacent to the Omitted Container as Depicted in the Load View Above. See General Note "Q" on Page 3.

LESS-THAN-FULL-LOAD PROCEDURE

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. NOTE THAT THE CENTER FILL ASSEMBLY HAS BEEN MODIFIED AS DESCRIBED ON PAGE 5.

